

REVISIONS TO THE STATE IMPLEMENTATION PLAN
FOR THE CONTROL OF OZONE AIR POLLUTION

REQUIREMENTS FOR GASOLINE VOLATILITY
IN EAST AND CENTRAL TEXAS

AND

FEDERAL CLEAN AIR ACT §211(c)(4)(C) WAIVER REQUEST

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
P.O. BOX 13087
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SECTION VI. CONTROL STRATEGY

A. Introduction (No change)

B. Ozone (Revised)

1. *Dallas/Fort Worth* (No change.)
2. *Houston/Galveston* (No change.)
3. *Beaumont/Port Arthur* (No change.)
4. *El Paso* (No change.)
5. *Regional Strategies* (No change.)
6. *Northeast Texas Flexible Attainment Region* (No change.)

C. Particulate Matter (No change.)

D. Carbon Monoxide (No change.)

E. Lead (No change.)

F. Oxides of Nitrogen (No change.)

G. Sulfur Dioxide (No change.)

H. Conformity with the National Ambient Air Quality Standards

I. Site Specific (No change.)

J. Mobile Sources Strategies (**Revised**)

1. *Inspection/Maintenance* (No change.)
2. *Transportation Control Measures* (No change)
3. *Vehicle Miles Traveled* (No change)
4. *Clean Gasoline* (**Revised**)

CLEANER GASOLINE SIP LIST OF ACRONYMS

AAMA - American Automobile Manufacturers Association
BPA - Beaumont/Port Arthur
CARE - Clean Air Responsibility Enterprise
CBG-Cleaner Burning Gasoline
CO - Carbon Monoxide
COAST - Coastal Oxidant Assessment for Southeast Texas
CRC - Coordinating Research Council
Commission - Texas Natural Resource Conservation Commission
DFW - Dallas/Fort Worth
ELP - El Paso
EP - End Point
EPA - United States Environmental Protection Agency
FCAA - Federal Clean Air Act
FTE - Full Time Employee
HGA - Houston-Galveston
I/M - Inspection and Maintenance
LDT - Light-Duty Trucks
LDV - Light-Duty Vehicles
LEV - Low Emission Vehicles
MY - Model Year
NAAQS - National Ambient Air Quality Standard
NLEV - National Low Emission Vehicles
NMHC - Non-Methane Hydrocarbon
NO_x - Nitrogen Oxides
ORVR - On-Board Refueling Vapor Recovery
OTAG - Ozone Transportation Assessment Group
PPB - Parts Per Billion
PPM - Parts Per Million
PSI - Pounds Per Square Inch
RFG - Reformulated Gasoline
RVP - Reid Vapor Pressure
SIP - State Implementation Plan
TCAS - Texas Clean Air Strategy
TCM - Transportation Control Measures
ULEV - Ultra Low Emission Vehicles
VOC - Volatile Organic Compound

**CLEANER GASOLINE SIP
LIST OF APPENDICES**

| APPENDIX | APPENDIX NAME |
|----------|--|
| A | Results of Preliminary Regional Modeling for Texas (No change) |
| B | Additional Modeling (No change) |

TABLE OF CONTENTS

Chapter 1: General **(Revised.)**

1.1 Background

1.2 Public Hearing Information

1.3 Social and Economic Considerations

1.4 Fiscal and Manpower Resources

Chapter 2: Background **(Revised)**

Chapter 3: Technical Information **(Revised)**

Chapter 4: Evaluation of Other Controls **(Revised)**

Chapter 5: Discussion of Texas' 8-hour Near-nonattainment Areas (No change)

CHAPTER 1: GENERAL

1.1 BACKGROUND

The State of Texas has four 1-hour ozone nonattainment areas: HGA, DFW, BPA, ELP. SIPs for attainment of the 1-hour ozone NAAQS are under development for the HGA, DFW, and BPA areas. Several other areas around the state have already had exceedances of the 8-hour NAAQS. Due to the significant air quality concerns under the 1-hour NAAQS, and the new challenges imposed by the 8-hour NAAQS, the commission is proposing regional types of controls for ozone.

The cleaner gasoline proposed in this SIP revision would have a lower RVP outside DFW and HGA, and a limit on the amount of sulfur in each gallon of gasoline. **In December 1999, the U. S. Environmental Protection Agency finalized rulemaking for a national low sulfur gasoline starting January 1, 2004. This rulemaking will result in a nationwide low sulfur gasoline with an average sulfur content of 30 ppm and a cap of 80 ppm. Since the national standard starts the same time as the proposed State low sulfur standard would have started, is more stringent than the proposed State standard, and will result in even greater emission reductions, the State sulfur requirement is being repealed in lieu of the national standard. Because the federal standard covers the same counties as the state rule, the state rule is no longer applicable under 30 TAC §114.302.**

The RVP required in this SIP revision is 7.8 psi starting May 1, 2000. The RVP limit would be in effect every summer from May 1st through October 1st. A 7.8 psi RVP fuel is expected to reduce evaporative emissions from automobiles, off-highway gasoline powered equipment, and all gasoline storage and transfer operations. Evaporative VOC emissions from automobiles will be reduced by at least 14%.

~~The sulfur cap is 150 ppm per gallon of gasoline, starting January 1, 2004. Low sulfur gasoline is expected to reduce NO_x emissions from today's cars by 8.5% according to the EPA complex model. The rules would further provide for counties or large cities to opt into these regulations earlier than proposed here provided certain conditions are met. If EPA were to adopt sulfur regulations to require compliance by January 1, 2004, the commission's rules would no longer apply, allowing the federal sulfur rules to take precedence. However, early opt-in areas would continue to follow the sulfur requirements of their early compliance plan until EPA actually implemented its regulations unless otherwise specified in the commission order.~~

Sulfur is a catalyst poison, and all vehicles with catalysts are adversely impacted by sulfur poisoning. Most cars and light trucks manufactured since MY 1975 have had catalysts installed. Sulfur competes for the active sites on the catalyst surface with the ozone precursors the catalyst is attempting to control, VOC and NO_x. Sulfur can also increase emissions of CO, a metabolic poison. In addition, sulfur interferes with the oxygen storage capacity on catalytic surfaces further exacerbating the impacts on NO_x emissions. Sulfur poisoning can be reversed on some vehicles under certain conditions. Most advanced technology cars, such as NLEV and proposed Tier II vehicles, can have their emission controls severely compromised by elevated sulfur levels found in fuel.

Section 211(c)(4)(A) of the FCAA prohibits states from prescribing or attempting to enforce any "control or prohibition" of a "characteristic or component of a fuel or fuel additive" if EPA has promulgated a control or prohibition applicable to such characteristic or component under §211(c)(1). Section 211(c)(4)(C) provides an exception to this prohibition for a nonidentical state standard contained

in a SIP where the standard is “necessary to achieve” the primary or secondary NAAQS that the SIP implements. EPA can approve a SIP provision as necessary if the Administrator finds that “no other measures that would bring about timely attainment exist,” or that “other measures exist and are technically possible to implement, but are unreasonable or impracticable.” Therefore, Texas is proposing this revision to the SIP as adequate justification and is requesting a waiver from §211(c)(4)(A) of the FCAA.

1.2 PUBLIC HEARINGS INFORMATION

The commission will hold public hearings on this proposal at the following times and locations: March 22, 2000, 7:00 p.m. in the Longview City Hall Council Chambers, 300 West Cotton Street, Longview; and March 23, 2000, 2:00 p.m. in Building E, Room 201S, Texas Natural Resource Conservation Commission Complex, 12100 Park 35 Circle, Austin. The hearings are structured for the receipt of oral or written comments by interested persons. Individuals may present oral statements when called upon in order of registration. Open discussion will not be permitted during the hearings; however, agency staff members will be available to discuss the proposal 30 minutes before each hearing and will answer questions before and after the hearings.

Written comments will also be accepted via mail or fax. All comments should be submitted to Lola Brown, Office of Environmental Policy, Analysis, and Assessment, P.O. Box 13087, MC 205, Austin, Texas 78711-3087 or fax number (512) 239-4808. The public comment period will close on March 27, 2000.

1.3 SOCIAL AND ECONOMIC CONSIDERATIONS

For a detailed explanation of the social and economic issues involved with any proposed strategies please refer to the preamble that precedes the rule package accompanying this SIP revision.

1.4 FISCAL AND MANPOWER RESOURCES

The state has determined that its fiscal and manpower resources are adequate and will not be adversely affected through implementation of this plan.

CHAPTER 2: BACKGROUND

At the time the 1990 FCAA Amendments were enacted, the focus on controlling ozone pollution was centered on local controls. However, for many years an increasing number of air quality professionals have asserted that ozone is a regional problem requiring regional strategies in addition to local control programs. As nonattainment areas across the United States prepared attainment demonstration SIP revisions in response to the 1990 FCAA Amendments, several areas found that modeling attainment was made much more difficult, if not impossible, because of high ozone and ozone precursor levels entering from the boundaries of their respective modeling domains (e.g., high background levels of ozone).

The commission conducted air quality modeling and upper air monitoring that found regional air pollution should be considered when addressing air quality in Texas' ozone nonattainment areas. This work is supported by research conducted by the OTAG, the most comprehensive attempt ever undertaken to understand and quantify the transport of ozone. Both the commission and OTAG study results point to the need to take a regional approach to controlling air pollutants.

As part of the COAST project, the commission and its contractor (Environ, Inc.), conducted regional-scale modeling to develop future year boundary conditions for the COAST modeling domain. The emissions inventory used in this modeling was based on the OTAG emission inventory. The modeling was conducted for a domain covering most of Texas as well as several southern states.

During the OTAG process, the commission modeling staff ran several sensitivity analyses using this regional modeling setup to assess the impact of potential OTAG reductions on Texas. Applying the OTAG 5c reductions across the domain (60% reduction of point source NO_x, 30% reduction of low-level NO_x, 30% reduction of VOC), compared to the case of no reductions, indicates that modeled reductions would significantly reduce ozone throughout most of the eastern half of Texas. Overall, the modeling indicates that a regional reduction strategy would be beneficial across a wide area of the state.

During modeling for the HGA attainment demonstration SIP revision, the commission modeling staff conducted sensitivity analyses to determine the benefits regional reductions might have on HGA, when applied simultaneously with local reductions. Unlike the commission regional modeling exercises discussed above, these model runs offer an opportunity to assess separately the benefits of reductions made within and outside a region, since model runs with and without the regional reductions scenarios in HGA were conducted. Modeling runs were completed to evaluate the 8-hour average ozone concentrations in the COAST modeling domain for September 8, 1993 with 2007 projected emissions and assuming a reduction of 70% NO_x and 15% VOC in the 8-county HGA area. Even with the large reductions in HGA, much of the upper Texas Coast is projected to be well above the 8-hour standard. Also, Austin, Victoria, and Corpus Christi showed modeled 8-hour average concentrations above 80 ppb. The benefit of applying OTAG 5c reductions outside the HGA 8-county area clearly showed that the reductions are beneficial to HGA and provided additional ozone benefits of between five and ten ppb in HGA. This modeling provides part of the evidence of the benefit of regional reductions on Texas' nonattainment areas. Additional modeling conducted by the agency showed 1-hour reductions of between 1 and 3.6 ppb in much of east and central Texas.

Conclusions from the commission's work are supported by OTAG studies that also illustrate the importance of implementing a regional air quality control strategy. Overall, the conclusions and

recommendations of OTAG are very consistent with a regional approach to ozone control, leading to the determination that **the regional approach is necessary** to achieve the NAAQS.

CHAPTER 3: TECHNICAL INFORMATION

3.1 OVERVIEW

The commission has evaluated a cleaner gasoline for the eastern and central parts of Texas. After much research, industry consultation, and communication with local, state and federal agencies, the commission has proposed a fuel it believes will move Texas much closer to achieving its overall air quality goals. The fuel the agency has proposed is a low RVP gasoline with a sulfur cap. **As noted in the introduction, the sulfur limits will now be based on the federal low sulfur requirements of an 80 ppm cap and 30 ppm average starting January 1, 2000. Although modeling was not reaccomplished to account for the lower federal sulfur standards, it is anticipated that the federal standards will provide greater NO_x reductions from current conventional gasoline levels compared to the reductions modeled for the State's proposed 150 ppm sulfur cap.** Results of the commission's evaluation efforts to date are summarized below along with more detail on the proposed low RVP/150 ppm sulfur fuel.

At the time the 1990 FCAA Amendments were enacted, the focus on controlling ozone pollution was centered on local controls. However, for many years an increasing number of air quality professionals have felt that ozone is a regional problem requiring regional strategies in addition to local control programs. As nonattainment areas across the United States prepared attainment demonstration SIPs in response to the 1990 FCAA Amendments, several areas found that modeling attainment was made much more difficult, if not impossible, because of high ozone and ozone precursor levels entering from the boundaries of their respective modeling domains, commonly called transport.

The commission has conducted air quality modeling and upper air monitoring that found regional air pollution should be considered when studying air quality in Texas' ozone nonattainment areas. This work is supported by research conducted by OTAG, the most comprehensive attempt ever undertaken to understand and quantify the transport of ozone. Both the commission and OTAG study results point to the need to take a regional approach to controlling air pollutants.

As part of the COAST project, the commission and its contractor Environ, Inc., conducted regional-scale modeling to develop future-year boundary conditions for the COAST modeling domain. The emissions inventory used in this modeling was based on the OTAG emission inventory and the modeling was conducted for a domain covering most of Texas as well as several southern states.

During the OTAG process, the commission's modeling staff ran several sensitivity analyses using this regional modeling setup to assess the impact of potential OTAG reductions on Texas. Applying the OTAG reductions across the domain (clean gasoline (federal reformulated gasoline), stationary source controls, the NLEV program, ozone action days, and a series of national rules to be promulgated by the EPA among others), compared to the case of no reductions, indicated that modeled reductions would significantly reduce ozone throughout most of the eastern half of Texas. Overall the modeling indicated that a regional reduction strategy would be beneficial across the wide area of the state.

During modeling for the HGA attainment demonstration SIP, the commission's modeling staff conducted sensitivity analyses to determine the benefits regional reductions might have on HGA, when applied simultaneously with local reductions. Unlike the commission's regional modeling exercises discussed above, these model runs offer an opportunity to assess separately the benefits of reductions made within and outside a region, since model runs with and without the regional reductions scenarios in HGA were run. Modeling runs were completed to evaluate the 8-hour average ozone concentrations

in the COAST modeling domain for September 8, 1993 with 2007 projected emissions and assuming a reduction of 70% NO_x and 15% VOC in the 8-county HGA area. Even with the large reductions in HGA, much of the upper Texas Coast is well above the 8-hour standard. Also, Austin, Victoria, and Corpus Christi show 8-hour average concentrations above 85 ppb. The benefit of applying OTAG reductions outside the HGA 8-county area clearly showed additional ozone benefits of between five and ten ppb in HGA.

Additional modeling indicates that mobile source reductions (cleaner gasoline, NLEVs, and Stage I vapor recovery) have a potential to reduce peak 8-hour ozone averages of between 1 and 4 ppb in much of east and southeast Texas, with the greatest reductions seen in the Austin and San Antonio areas. This modeling indicates significant reductions in some areas with lessor reductions in others. The main conclusion to be drawn from these models is that the appropriate controls have been selected for reducing ozone levels. Modeling has also been completed assessing the potential benefits for 1-hour ozone standards. This most recent modeling shows reductions of between 1 and 3.6 ppb in much of east and central Texas.

This modeling provides part of the evidence of the benefit of regional reductions on Texas' nonattainment areas and provides further justification that a regional strategy will help maintain air quality in attainment and near-nonattainment areas. Conclusions from the commission's work are supported by OTAG studies that also illustrate the importance of implementing a regional air quality control strategy.

A cleaner gasoline is also supported based on the mobile nature and commuter lifestyle the larger urban areas promote. The majority of Texas' population centers are in the coverage area for cleaner gasoline. The highway system of Houston-Corpus-San Antonio-Austin-Dallas/Fort Worth-Tyler/Longview connects these major population centers. ~~It is~~ It's important that the fuel used by automobiles traveling between these cities is equally clean. Emissions control is very difficult in nonattainment and near-nonattainment areas if vehicles traveling in from other areas contain gasoline that is not as clean as it could be.

Timing is another critical issue where a cleaner gasoline can help. Several of our near-nonattainment areas face critical years between now and 2004. ~~when EPA is expected to start its Tier II vehicles and low sulfur gasoline program.~~ By implementing a cleaner fuel, the entire eastern half of the state would experience emission reductions in the critical mobile source inventory which is vitally important to our major metropolitan areas.

The commission has completed modeling. The first run was modeled with NLEV, cleaner gasoline, Stage I, and 50% point source NO_x reductions and showed upwards of a twelve ppb decrease in ozone. A modeling run was also made using only the mobile source controls (the NLEV program, cleaner gasoline, and Stage I vapor recovery). This second modeling run showed an overall ozone reduction of about 4 ppb. Based on the available monitoring data, these levels of reduction may be enough to keep the near-nonattainment areas in attainment with the 8-hour NAAQS. Reductions in the regional levels of ozone and ozone precursors will help to reduce the maximum ozone concentration and the duration of ozone events in the nonattainment areas. With the mobile nature and commuter lifestyle of larger urban areas, a cleaner gasoline over a broader area is much more reasonable and practicable than other types of controls. Further modeling for the 1-hour ozone standard backs up the results seen for 8-hour modeling (i.e. 1-3.6 ppb reductions in 1-hour ozone readings).

Texas and other states have used low RVP fuels for a number of years as an effective program for reducing ozone levels. **As the low sulfur fuel adopted by the EPA does not limit RVP, the Commission believes it important to implement the low RVP for East Texas.** ~~While EPA is not looking at RVP, it is considering lowering the sulfur content of all U.S. gasoline concurrent with its evaluation of new motor vehicles standards (Tier II). The Tier II regulations should be finalized in late 1999 with a new fuel starting in 2004. Texas has watched and has been a part of the national debate on cleaner gasoline. Texas will continue these efforts and if the national situation continues in a timely and positive direction, Texas may not need to proceed on its own with the lower sulfur aspect of cleaner gasoline. However, if reductions in sulfur at the national level are not consistent with where Texas needs be in relation to mobile source controls and do not occur in a timely manner, then Texas must proceed with sulfur controls on gasoline.~~

Through the NLEV program, automobile manufacturers have made a commitment to introduce cleaner cars to the nation earlier than what would have been required by the FCAA. Additionally, EPA has ~~proposed~~ **finalized** Tier II regulations which will also lead to improvements in the popular sport utility vehicles. The reductions from these actions, although significant, may not be enough to get Texas where it needs to be in relation to overall air quality. Improvements in gasoline quality alone also may not be enough. An improvement in gasoline quality, combined with the advanced vehicle technology, will move Texas closer to achieving its overall air quality goals than either step alone could possibly achieve.

~~Texas refineries supply gasoline not only to the Texas market but also to markets outside of Texas. One state which will be relying on Texas and other Gulf Coast refineries for its supply of low RVP/low sulfur gasoline is Georgia. Gasoline already being delivered for the Atlanta area is very similar to the fuel being proposed by Texas. Also at the national level, sulfur reductions are likely to be the means most refiners will use to meet the Phase II RFG requirement for NO_x reductions. Phase II RFG will have sulfur levels very close to what is proposed for the Texas market. Sulfur reductions are also part of EPA's Tier II proposal. Based on these factors, EPA's evaluation of fuel sulfur limits, Phase II RFG with reductions in fuel sulfur, and other states' consideration of sulfur limits, the commission believes the fuel proposed here is consistent with national trends regarding improvements in fuel quality.~~

Starting in late 1997, the commission began to evaluate different types of cleaner burning fuels (gasoline, diesel, etc.) as part of an overall regional strategy. The commission eventually settled its focus on a cleaner gasoline. Of the cleaner gasolines under consideration, four were evaluated thoroughly: 1) federal RFG; 2) a gasoline with equal emissions performance to federal Phase II RFG; 3) a formula-based fuel with low RVP, low sulfur fuel; and 4) California reformulated gasoline.

After further discussions, the commission completed its analysis on the top two fuels of choice, a performance-based fuel with emissions limits equal to federal phase II RFG, and a fuel with controls on RVP and sulfur. The low RVP/low sulfur fuel was settled upon for the following reasons: 1) emissions performance; 2) effect on advanced technology cars; 3) impacts on off-road emissions; and 4) low production costs.

3.2. EMISSIONS PERFORMANCE

Several of the state's areas are in need of significant NO_x reductions along with some level of VOC reductions. Photochemical grid modeling shows that NO_x reductions are necessary for the HGA, DFW,

and BPA nonattainment areas to demonstrate attainment of the 1-hour ozone standard and are very beneficial for the state's near-nonattainment areas to comply with the 8-hour ozone standard. Therefore, one of the first objectives of a cleaner gasoline was that it achieve NO_x reductions.

Additional state and federal modeling has shown that reductions in VOCs, specifically in the urbanized areas, continue to contribute to reductions in ozone. Lower RVP gasoline will reduce evaporative emissions of VOCs from not only motor vehicles but from refueling operations, gasoline terminals, off-road equipment, and refineries. The reduction of sulfur will help today's cars maintain their certified emissions levels and tomorrow's more advanced cars reach and maintain their low tailpipe emission limits.

Radian completed specific modeling for the commission in September 1997 ("Evaluating the Impact of Reformulated Gasoline in the DFW Area") evaluating low RVP and RFG. EPA's complex model indicates VOC emission reductions of 14.3% with 7.8 psi RVP fuel and a 150 ppm cap on sulfur. NO_x reductions of 8.5% are also seen with the low RVP/low sulfur fuel proposed here.

Some national studies conducted by a variety of groups regarding the impact of fuel sulfur on current and advanced technology vehicles have been completed. Some of these groups include: private industry (such as the AAMA), the automotive and refining industries (The Auto/Oil Air Quality Research (Auto/Oil) program), the federal government (EPA), state government (California, Georgia, Arizona), and other groups, such as the CRC and OTAG.

Estimates by EPA in their "Staff Paper on Gasoline Sulfur Issues" indicate that in-use vehicles, such as vehicles certified to the Tier 0 standard which have been available through MY 1993 and vehicles certified to the Tier I standard which have been available since MY 1994, show additional reductions in emissions associated with a reduction in gasoline sulfur levels.

| Decrease in Emissions with Fuel Sulfur Decreasing from Average In-Use Level (330 ppm) for Tier 0 and Tier I Vehicles (Source EPA) | | | | | | |
|--|---|--------|---|--------|---|--------|
| | NMHC | | CO | | NO _x | |
| Sulfur | 150 ppm | 40 ppm | 150 ppm | 40 ppm | 150 ppm | 40 ppm |
| Tier 0 | 4.6 % | 13.0 % | 4.4 % | 12.6 % | 5.0 % | 11.1 % |
| Tier I | not tested but assumed to be equivalent to Tier 0 | 16.3% | not tested but assumed to be equivalent to Tier 0 | 16.4% | not tested but assumed to be equivalent to Tier 0 | 11.0 % |

Using EPA's Complex Model, Georgia estimated the benefits of its low RVP/low sulfur gasoline. The Complex Model shows the following emission reductions from conventional fuel (modeled with 8.7 psi RVP, 330 ppm sulfur, benzene at 1.53 volume percent, olefins at 9.2 volume percent, and aromatics at 32 volume percent) for the second phase of Georgia's program (modeled with RVP at 7.0 psi, 40 ppm sulfur, olefins 4 volume percent, and aromatics 22 volume percent):

| Emission Reductions: Georgia Evaluation of Their Phase II Formula-Based Gasoline Using EPA's Complex Model | | | |
|---|----|-----------------|------------|
| VOC | CO | NO _x | Air Toxics |
| 23.9% | NA | 14.71% | 20.59% |

It should be noted that the Complex Model assumes a 1990 (Tier 0) technology vehicle. It does not take into consideration Tier I or advanced technology cars (LEVs, ULEVs), nor does it consider the effects on heavier light-duty trucks (LDT 3's and 4's).

OTAG also evaluated a low sulfur fuel in typical attainment areas (no I/M, etc.) and found that with a 150 ppm sulfur level the following emission reductions were obtainable:

| Emission Reductions: OTAG Evaluation of Low Sulfur (150 ppm) Gasoline | | | |
|--|------------|-----------------|------------|
| VOC | CO | NO _x | Air Toxics |
| 2.5 - 5.3% | 3.3 - 8.0% | 4.4% | NA |

3.3. EFFECT ON ADVANCED TECHNOLOGY CARS

For advanced technology cars (LDV) and LDTs covered by the NLEV program (LEVs/ULEVs), EPA estimated emission increases with fuel sulfur above 40 ppm. These numbers are not comparable to the earlier table on Tier 0 and Tier I emissions improvements with low sulfur fuel. It was assumed that a low sulfur fuel would be used to certify advanced technology vehicles; therefore, the emissions impacts of fuel sulfur levels are indicated as percent increases over 40 ppm sulfur certification fuel.

| Increase in Emissions with Fuel Sulfur Increases from Baseline (40 ppm) for LEVs and ULEVs (LDVs and LDTs) (Source EPA) | | | | | | |
|--|---------|---------|---------|---------|-----------------|---------|
| Pollutant | NMHC | | CO | | NO _x | |
| Sulfur, ppm | 150 ppm | 330 ppm | 150 ppm | 330 ppm | 150 ppm | 330 ppm |
| All LDV/LDT1 | 26.7 % | 43.0 % | 58 % | 75.8 % | 65.7 % | 136 % |
| All LDT2/LDT3 | 23.0 % | 26.4 % | 12.5 % | 31.2 % | 33.7 % | 65.5 % |

3.4 IMPACTS ON OFF-ROAD EMISSIONS

For non-road engines, there will be evaporative VOC benefits associated with the low RVP/low sulfur fuel. There may also be some exhaust benefits for VOC. However, NO_x benefits may be very minor, mainly because sulfur effects are associated with catalyst-equipped vehicles and engines, and non-road engines typically are not catalyst-equipped. VOC emission reductions of upwards of 3% may be seen in off-road sources.

3.5 STATE LEGAL AUTHORITY TO IMPLEMENT CLEANER GASOLINE

State authority for the commission to implement Cleaner Gasoline is contained in the following statutes:

- Texas Health and Safety Code §382.011 (general power and duties),
- Texas Health and Safety Code §382.012 (authority for SIPs),
- Texas Health and Safety Code §382.017 (authority to promulgate rules),
- Texas Health and Safety Code §382.019 (authority to control mobile sources),
- Texas Health and Safety Code §382.037(g) (confirms no specific authority needed for fuel standards if the standards are 1) federal standards, 2) necessary to achieve attainment, or 3) made in consultation with the Texas Department of Health and it is determined that a fuel standard is needed to protect public health),
- Texas Health and Safety Code §382.039, provides the commission the authority to develop and implement transportation programs and other measures necessary to demonstrate attainment and protect the public from exposure to hazardous air contaminants from motor vehicles,
- Texas Water Code §5.103, provides the commission with the authority to adopt rules necessary to carry out its powers and duties under the TWC,
- Texas Water Code Chapter §7.002 (commission can enforce its rules), and
- Texas Water Code §28.011, which provides the commission with the authority to adopt and enforce rules to protect and preserve underground water quality.

3.6 PRODUCTION COSTS OF LOW RVP/LOW-SULFUR GASOLINE

Low RVP gasolines are used as VOC control strategies and do not have significant additional production costs. Average summertime RVP is about 8.5 - 9.0 psi. Other states have found that it generally costs from 0.3 to 0.5 cents more per gallon to produce low RVP (7.0 psi) gasoline. According to EPA's Regulatory Impact Analysis for RFG, RVP controls cost about 0.2 cents per psi of RVP reduced. For example going from 8.8 psi to 7.8 psi would cost about 0.2 cents per gallon. Therefore, the RVP reduction proposed here would cost less than 0.3 cents per gallon.

~~The American Petroleum Institute contracted with MathPro to estimate sulfur reduction costs. The estimated costs are as follows:-~~

| Estimated Cost of Reducing Gasoline Sulfur (MathPro for API) | | | |
|---|----------------|----------------|----------------|
| Average Sulfur Control Level (ppm) | 150 | 100 | 40 |
| Cost (cents/gallon) | 2.7 | 3.4 | 5.1 |

~~EPA also estimated costs of reducing sulfur and determined the following:-~~

| Preliminary Estimates of Sulfur Reduction Costs (Volume-Weighted Average for PADDs 1 and 3, 8% return on investment) | | | |
|---|----------------------|----------------------|----------------------|
| Average Sulfur Control Level (ppm) | 150 | 100 | 40 |
| Cost (cents/gallon) | 1.1 - 1.8 | 1.9 - 3.0 | 5.1 - 8.0 |

However, EPA said they were aware of emerging technologies that could reduce sulfur reduction costs down to 1-2 cents per gallon when going from 330 ppm to 40 ppm sulfur. The costs for a 150 ppm fuel would logically be lower. Today, Georgia is receiving 7.0 RVP and 150 average sulfur fuel. This fuel is costing an average of 2.0 cents more per gallon than conventional fuel.

3.7 AGENCY IMPACTS

The commission will enforce the low RVP program at all levels of the distribution chain through inspection of on-site documentation. All affected persons are required to maintain, and provide for review upon request, product transfer documents. These documents would be required to be maintained for a minimum of two years.

~~A low RVP/low sulfur fuel would be easier to enforce in the long run than a performance-based fuel. The commission will enforce the program at the refinery gate and at the bulk terminal. Enforcement at the retail level will also be accomplished as necessary through scheduled and unscheduled retail level sampling. With only two parameters to check initially (RVP and sulfur), fuel testing would be simplified over a performance-based fuel like federal RFG.~~

~~Georgia has decided to enforce its program mainly at the refinery level. Each refiner is required to take two samples of each batch of fuel and have it tested. This same sample will be sent to a state contracted lab for verification. It also plans on using its Stage II inspectors to pull follow up samples as the inspector is doing the regular Stage II inspection.~~

~~The Arizona Weights and Measures Department is responsible for enforcing the Arizona CBG program. It has six inspectors for the whole state, one dedicated to Maricopa County. Arizona has tested for gasoline quality since the early 90's, and the parameters tested include: sulfur, octane (research, motor, and index), distillation temperatures (10%, 50%, 90%, EP, and residue), oxygen (type and quantity), aromatics (including benzene), olefins, and saturates. Arizona had its own lab until about 1997, and now has a contract to complete this testing. The one inspector dedicated to Maricopa County collects approximately 80 random samples a month. According to Arizona, each station eventually gets inspected. The Arizona Legislature appropriated one FTE for the Arizona Weights and Measures Department to organize the program and register the refiners, and \$150,000 for the Arizona CBG program in Maricopa County. Arizona has such low costs due to the fact that they already have a gasoline inspection program in place.~~

~~The area proposed to be covered by the Cleaner Gasoline program is larger and impacts more gas stations and people than Arizona's program. The Texas program will cover 98 counties and about 40% of the state's population and gas stations.~~

CHAPTER 4: EVALUATION OF OTHER CONTROLS

In the HGA and DFW areas there are significant mobile source control measures in place. Some of these include inspection and maintenance (I/M), Stage I vapor recovery, Stage II vapor recovery, RFG, and transportation control measures (TCMs). Additional mobile source controls will be put in place through federal regulations such as NLEV, heavy-duty on-highway diesel controls, small gas engines, locomotives controls etc.

The federal mobile source controls are national programs which will be implemented in all counties. However, most are being phased in such that these controls will not be in place soon enough for many of Texas' near nonattainment areas to avoid nonattainment designation. In addition to the clean gasoline, Stage I controls is another program that can be implemented quickly and therefore is also being proposed.

State law (§382.037(c)) prohibits the Texas Motorist Choice program from expanding to additional areas unless the mayor of the largest city and the county judge agrees to expansion of the program. At this time, there is not significant local interest in expanding the Texas Motorist Choice program to the 95 counties affected by this rule attainment areas, making I/M impracticable as a wider control measure.

Stage II vapor recovery is prohibited by state law from expansion into attainment areas (Texas Health and Safety Code, §382.019(c)). In addition, Stage II vapor recovery is being replaced by on-board refueling vapor recovery (ORVR). ORVR will capture the majority of vehicle refueling vapors within the next 12 to 18 years. The state prohibition combined with the federal implementation of ORVR makes Stage II impracticable for use as an additional control measure.

With significant VOC point source controls already in place in the HGA and DFW areas, additional VOC point source controls for these areas do not appear to be reasonable at this time. Significant point source controls for NO_x will be put in place in the HGA and DFW areas. The magnitude of the reductions necessary indicates that point source controls alone are not able to reduce ozone levels enough to demonstrate attainment; therefore, additional NO_x controls must come from the mobile source area. Cleaner gasoline will contribute to provide NO_x reductions from commuters coming in from outlying areas.

The commission is also evaluating the implementation of point source NO_x controls outside the HGA and DFW areas. The commission believes that the combination of mobile source controls (such as cleaner gasoline, NLEV, and Stage I vapor recovery), and point source NO_x controls outside the HGA and DFW areas will be sufficient to significantly reduce the ozone levels in the state's nonattainment areas.

Modeling has previously been submitted to EPA regarding the amount of emission reduction necessary to achieve the NAAQS in the HGA and DFW areas to achieve attainment (see Tables 1, 2, 3, and 4). The NO_x and VOC reductions necessary to achieve the NAAQS are significant (see Tables 5, 6, 7, and, 8).

Several other areas of the state have already had exceedances of the 8-hour NAAQS. The emissions inventory in several of these areas are largely composed of mobile sources. Without the cleaner gasoline, these areas cannot reasonably and practicably achieve attainment of the NAAQS.

Table 1. Attainment Target Calculations for 2007 NO_x Emissions in the HGA Area

| | Episode Day | | | |
|---|-------------|-------|-------|-------|
| | 9/8 | 9/9 | 9/10 | 9/11 |
| Required reduction from 2007 base EI | | | | |
| Worst-case | 83 % | 78 % | 85 % | 80 % |
| Best-case | 62 % | 53 % | 67 % | 61 % |
| 2007 Projected NO _x emissions (tons/day) | | | | |
| Worst-Case (Base 2007 EI) | 1467 | 1457 | 1531 | 1376 |
| Best-Case (Alt. EI I) | 986 | 978 | 1035 | 930 |
| 2007 Attainment target (tons/day) | | | | |
| Worst-case | 249 | 321 | 230 | 275 |
| Best-case | 375 | 460 | 342 | 363 |
| 1990 baseline NO _x emissions (tons/day) | | | | |
| Adjusted for Alt. EI I Assumptions | | 1330 | | |
| | | 908 | | |
| Required reduction relative to 1990 baseline | | | | |
| Worst-case | 82 % | 77 % | 83 % | 80 % |
| Best-case | 59 % | 49 % | 62 % | 60 % |
| Required Reduction in tons/day | | | | |
| Worst-case | 1081 | 1009 | 1100 | 1055 |
| Best-case | 533 | 448 | 566 | 545 |
| Reductions by 1999 from 9 % SIP | (104) | (104) | (104) | (104) |
| Remaining required reductions | | | | |
| Worst-case | 977 | 905 | 996 | 951 |
| Best-case | 429 | 344 | 462 | 441 |

Table 2. Attainment Target Calculations for 2007 VOC Emissions in the HGA Area

| | Episode Day | | | |
|--|-------------|-------|-------|-------|
| | 9/8 | 9/9 | 9/10 | 9/11 |
| Required reduction from 2007 base EI | 15% | | | |
| 2007 Projected VOC emissions (tons/day) | 831 | 838 | 849 | 847 |
| 2007 Attainment target (tons/day) | 706 | 712 | 722 | 720 |
| 1990 baseline VOC emissions (tons/day) | 1064 | | | |
| Required reduction relative to 1990 baseline | 34% | 33% | 32% | 32% |
| Required reductions in tons/day | 358 | 352 | 342 | 344 |
| Reductions by 1999 from 15% & 9% SIPs | (305) | (305) | (305) | (305) |
| Remaining required reductions in tons/day | 53 | 47 | 37 | 39 |

Table 3. Attainment Target Modeling: Reduction Levels and Predicted Design Values

| Model Run # | Reduction | | Predicted Design Value (ppb) |
|---------------|-----------------|-----|------------------------------|
| | NO _x | VOC | |
| 1 (1999 Base) | 0% | 0% | 139 |
| 2 | 30% | 25% | 128 |
| 3 | 40% | 25% | 124 |
| 4 | 50% | 25% | 121 |
| 5 | 60% | 25% | 116 |
| 6 | 70% | 25% | 109 |
| 7 | 80% | 25% | 100 |

Table 4. Attainment Target Modeling: Reduction Levels and Peak Modeled Ozone

| Model Run # | Reduction | | Peak Modeled Ozone (ppb) | | |
|---------------|-----------------|-----|--------------------------|---------|--------|
| | NO _x | VOC | 6/21/95 | 6/22/95 | 7/3/96 |
| 1 (1999 Base) | 0% | 0% | 140 | 145 | 168 |
| 2 | 30% | 25% | 130 | 135 | 154 |
| 3 | 40% | 25% | 126 | 129 | 149 |
| 4 | 50% | 25% | 122 | 124 | 142 |
| 5 | 60% | 25% | 116 | 118 | 134 |
| 6 | 70% | 25% | 109 | 110 | 127 |
| 7 | 80% | 25% | 100 | 99 | 120 |

Table 5. Potential VOC Control Strategies*Federal Control Strategies*

| Control Measure | Estimated 2007 Emissions Reduction (tpd) |
|--|--|
| Small Gasoline Engines <i>(began phase-in 1995--phase in complete by 2005)</i> | 50.80 |
| Heavy Duty Diesel Non-Road <i>(began phase-in 1995--phase-in complete by 2008)</i> | 1.74 |
| Locomotives <i>(final rule--begin phase-in 1999--complete by 2005)</i> | 0.00 |
| Reformulated Gasoline, FMVCP Tier I, I/M <i>(RFG Phase II begins in 2000--other programs in place)</i> | 29.06 |
| Recreational Marine Engines <i>(began phase -in 1995--complete by 1998)</i> | 5.42 |
| Commercial Aircraft <i>(rule took effect in 1994)</i> | 1.17 |
| RFG Non-Road Mobile Sources <i>(RFG Phase II begins in 2000)</i> | 3.48 |
| MACT Standards--Core Counties <i>(*Please see note below)</i> | 16.5 |
| MACT Standards--Perimeter Counties out to 100km | 3.5 |

State Control Strategies

| | |
|---|--|
| National Low Emissions Vehicle Program--Core Counties <i>(begins phase-in MY2001)</i> | 4.66 |
| National LEV Program--perimeter counties--100km | 0.95 |
| Reformulated Gasoline out to 100km | 16.33 |
| VOC RACT out to 100km | 7.90 |
| Stage I out to 100km | 23.91 |
| Excess VOC Reduction Carryover from 9% SIP | 0.69 |
| Voluntary Industry Reductions | Amount not available at time of proposal |

Local Options Control Strategies

| | |
|--|-------|
| Reductions Available from Local Option (See Appendix 9c-J for more details) | 60.91 |
|--|-------|

*Historically, most MACT standards have been promulgated 1-2 years after their required promulgation date. There are approximately 30 MACT standards that were slated to be promulgated by 1997. Most appear to be running 1-2 years late for their predicted promulgation date. There are approximately 60 standards in the 2000 bin. Current EPA information is that most are on track for promulgation by 2000. Compliance dates for MACT standards are typically three years after promulgation. Therefore, even if the historical pattern of delay occurs for the 1997 bin standards, it's reasonable to assume that sources will be in compliance by 2002, and that the 2000 bin standards will be promulgated and generating emission reductions by 2005.

Table 6. Potential NO_x Control Strategies*Federal Control Strategies*

| Control Measure | Estimated 2007 Emissions Reduction (tpd) |
|--|--|
| On-Road Heavy Duty Diesel Standards (proposed in 1997--effective date 2004) | 6.98 |
| Heavy Duty Diesel Non-Road (began phase-in 1995--phase-in complete by 2008) | 32.61 |
| Locomotives (final rule--begin phase in 1999--complete by 2005) | 6.49 |
| Reformulated Gasoline, FMVCP Tier I, I/M (RFG effective in 2000--other programs in place currently) | 39.93 |

State Control Strategies

| | |
|---|--|
| National Low Emissions Vehicle Program--Core Counties (currently under negotiation--could begin phase-in MY2001) | 12.15 |
| National LEV Program--perimeter counties--200km | 7.44 |
| Reformulated Gasoline--perimeter counties--200km | 12.38 |
| NO _x RACT applied to perimeter counties--200km | 80.00 |
| Excess Reductions from 9% SIP--Carryover | 4.25 |
| Voluntary Industry Reductions | Amount not available at time of proposal |
| Point Source Combustion Modification--Tier I--Core Counties | 241.00 |
| Point Source Flue Gas Controls--Tier II--Core Counties | 584.00 |
| Point Source Tier I + Tier II=Tier III--Core Counties | 620.00 |
| Point Source Tier I--Perimeter Counties | 333.00 |
| Point Source Tier II--Perimeter Counties | 811.00 |
| Point Source Tier III--Perimeter Counties | 864.00 |
| Reformulated Gasoline for Non-Road Sources | Amount not available at time of proposal |

Local Options Control Strategies

| | |
|--|-------|
| Reductions Available from Local Option (See Appendix 9c-J for more details) | 72.74 |
|--|-------|

CHAPTER 5: DISCUSSION OF TEXAS' 8-HOUR NEAR-NONATTAINMENT AREAS

(No changes or revisions)